

## APPENDIX A

**United States Patent** [19]**Odani et al.**[11] **Patent Number:** **5,059,491**[45] **Date of Patent:** **Oct. 22, 1991**[54] **CERMET BLADE MEMBER FOR CUTTING-TOOLS AND PROCESS FOR PRODUCING SAME**[75] **Inventors:** Niro Odani; Kazuyoshi Yoshioka; Sinichi Sekiya, all of Tokyo, Japan[73] **Assignee:** Mitsubishi Metal Corporation, Tokyo, Japan[21] **Appl. No.:** 435,200[22] **Filed:** Nov. 9, 1989[30] **Foreign Application Priority Data**

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0259192 3/1988 European Pat. Off. .  
 0302635 2/1989 European Pat. Off. .  
 0337696 10/1989 European Pat. Off. .  
 52-134614 11/1977 Japan .  
 54-2912 1/1979 Japan .  
 54-87719 7/1979 Japan .  
 54-103709 8/1979 Japan .  
 56-5946 1/1981 Japan .  
 56-20141 2/1981 Japan .  
 56-152937 11/1981 Japan .

58-213843 12/1983 Japan .  
 61-186434 8/1986 Japan .  
 61-213339 9/1986 Japan .  
 61-243139 10/1986 Japan .  
 61-281835 12/1986 Japan .  
 62-278267 12/1987 Japan .  
 63-99103 4/1988 Japan .

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A blade member for cutting-tools includes a cermet substrate which contains, apart from unavoidable impurities, a binder phase and a hard dispersed phase. The binder phase contains 5% to 30% by weight of cobalt and/or nickel. The hard dispersed phase contains a balance composite carbonitride of titanium and one or more of the elements tungsten, molybdenum, tantalum, niobium, hafnium and zirconium. The composite carbonitride satisfies the relationship  $0.2 \leq b/(a+b) \leq 0.7$ , where a and b denote atomic ratios of carbon and nitrogen, respectively. The substrate includes a hard surface layer in which the maximum hardness is present at a depth between 5  $\mu\text{m}$  and 50  $\mu\text{m}$  from a substrate surface thereof. The substrate surface has a hardness of 20% to 90% of the maximum hardness.

**4 Claims, 2 Drawing Sheets**